

WHAT IS CLAIMED IS:

1 1. An isolated nucleic acid encoding a polypeptide comprising the amino acid  
2 sequence of SEQ ID NO:45, wherein said polypeptide acts enzymatically as an enoyl  
3 reductase and binds a flavin prosthetic group.

1 2. The isolated nucleic acid of Claim 1 wherein the polypeptide is a bacterial  
2 enzyme or an active fragment of the bacterial enzyme.

1 3. The isolated nucleic acid of Claim 2 wherein the bacterial enzyme has an  
2 amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID  
3 NO:2 comprising a conservative amino acid substitution, SEQ ID NO:4, SEQ ID  
4 NO:4 comprising a conservative amino acid substitution, SEQ ID NO:6, SEQ ID  
5 NO:6 comprising a conservative amino acid substitution, SEQ ID NO:10, SEQ ID  
6 NO:10 comprising a conservative amino acid substitution, SEQ ID NO:12, SEQ ID  
7 NO:12 comprising a conservative amino acid substitution, SEQ ID NO:14, SEQ ID  
8 NO:14 comprising a conservative amino acid substitution, SEQ ID NO:16, SEQ ID  
9 NO:16 comprising a conservative amino acid substitution, SEQ ID NO:18, SEQ ID  
10 NO:18 comprising a conservative amino acid substitution, SEQ ID NO:20, and SEQ  
11 ID NO:20 comprising a conservative amino acid substitution

1 4. The isolated nucleic acid of Claim 3 comprising a nucleotide sequence  
2 selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5,  
3 SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17, and  
4 SEQ ID NO:19.

1 5. An isolated nucleic acid that hybridizes under standard hybridization  
2 conditions to a cDNA comprising the nucleotide sequence selected from the group  
3 consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:9, SEQ ID  
4 NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17, and SEQ ID NO:19.

1 6. A recombinant DNA molecule that consists of the isolated nucleic acid of

2 Claim 1 and a heterologous nucleotide sequence.

1 7. A recombinant DNA molecule that is operatively linked to an expression  
2 control sequence, wherein the recombinant DNA comprises the isolated nucleic acid  
3 of Claim 1.

1 8. An expression vector containing the recombinant DNA of Claim 6.

1 9. A cell comprising the expression vector of Claim 7.

1 10. A method of expressing a recombinant polypeptide in the cell of Claim 8  
2 comprising culturing the cell in an appropriate cell culture medium under conditions  
3 that provide for expression of the polypeptide by the cell, wherein said recombinant  
4 polypeptide comprises the amino acid sequence of SEQ ID NO:45, can bind a flavin  
5 prosthetic group and can act enzymatically as an enoyl reductase.

1 11. The method of Claim 9 further comprising the step of purifying the  
2 recombinant polypeptide.

1 12. The recombinant polypeptide purified by the method of Claim 11.

1 13. A nucleic acid comprising a polypeptide that has at least 80% identity with a  
2 bacterial enzyme comprising an amino acid sequence selected from the group  
3 consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:10, SEQ ID  
4 NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18, and SEQ ID NO:20;  
5 wherein said polypeptide binds a flavin prosthetic group and has enoyl reductase  
6 activity.

1 14. A nucleic acid comprising a polypeptide that comprises at least 12 consecutive  
2 amino acids of a bacterial enzyme that has an amino acid sequence selected from the  
3 group consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:10,  
4 SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18, and SEQ ID

5 NO:20; wherein said polypeptide binds a flavin prosthetic group and has enoyl  
6 reductase activity.

1 15. An isolated polypeptide comprising the amino acid sequence of SEQ ID  
2 NO:45, wherein said polypeptide acts enzymatically as an enoyl reductase and binds a  
3 flavin prosthetic group; and wherein said polypeptide is not a yeast enzyme.

1 16. The polypeptide of Claim 15 that is a bacterial enzyme or an active fragment  
2 of the bacterial enzyme.

1 17. The bacterial enzyme of Claim 15 that has an amino acid sequence selected  
2 from the group consisting of SEQ ID NO:2, SEQ ID NO:2 comprising a conservative  
3 amino acid substitution, SEQ ID NO:4, SEQ ID NO:4 comprising a conservative  
4 amino acid substitution, SEQ ID NO:6, SEQ ID NO:6 comprising a conservative  
5 amino acid substitution, SEQ ID NO:10, SEQ ID NO:10 comprising a conservative  
6 amino acid substitution, SEQ ID NO:12, SEQ ID NO:12 comprising a conservative  
7 amino acid substitution, SEQ ID NO:14, SEQ ID NO:14 comprising a conservative  
8 amino acid substitution, SEQ ID NO:16, SEQ ID NO:16 comprising a conservative  
9 amino acid substitution, SEQ ID NO:18, SEQ ID NO:18 comprising a conservative  
10 amino acid substitution, SEQ ID NO:20, and SEQ ID NO:20 comprising a  
11 conservative amino acid substitution.

1 18. A polypeptide that has at least 80% identity with a bacterial enzyme  
2 comprising an amino acid sequence selected from the group consisting of SEQ ID  
3 NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:10, SEQ ID NO:12, SEQ ID  
4 NO:14, SEQ ID NO:16, SEQ ID NO:18, and SEQ ID NO:20; wherein said polypeptide  
5 binds a flavin prosthetic group and has enoyl reductase activity.

1 19. A fusion protein comprising the polypeptide of Claim 15.

1 20. A polypeptide comprising at least 12 consecutive amino acids of a bacterial

2 enzyme that has an amino acid sequence selected from the group consisting of SEQ  
3 ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID  
4 NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18, and SEQ ID NO:20.

1 21. An antigenic fragment of a bacterial enzyme that has an amino acid sequence  
2 selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6,  
3 SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18,  
4 and SEQ ID NO:20.

1 22. A fusion protein comprising the antigenic fragment of Claim 21.

1 23. An antigenic fragment of a peptide that has an amino acid sequence selected  
2 from the group consisting of SEQ ID NO:46 or SEQ ID NO:46 comprising a  
3 conservative amino acid substitution.

1 24. A fusion protein comprising the antigenic fragment of Claim 23.

1 25. A vaccine comprising the antigenic fragment of Claim 23.

1 26. An antibody to the antigenic fragment of Claim 23.

1 27. The antibody of Claim 26 that is a monoclonal antibody.

1 28. The antibody of Claim 27 that is a chimeric antibody.

1 29. An immortal cell line that produces a monoclonal antibody of Claim 27.

1 30. An antibody to the polypeptide of Claim 15.

1 31. A method for identifying an agent that can modulate the enzymatic activity of  
2 an enoyl reductase comprising:  
3 (a) measuring the enzymatic activity of an enoyl reductase or active

4 fragment thereof in the presence and absence of a compound; wherein said enoyl  
5 reductase comprises the amino acid sequence of SEQ ID NO:45 and a flavin  
6 prosthetic group, or the amino acid sequence of SEQ ID NO:57; and  
7 (b) identifying the compound as an agent that modulates the enzymatic  
8 activity of an enoyl reductase when the enzymatic activity measured in step (a) is  
9 different in the presence of the compound relative to in the absence of the compound.

1 32. The method of Claim 31 wherein the enzymatic activity is lower in the  
2 presence of the compound relative to in the absence of the compound, and wherein  
3 the compound is identified as an inhibitor.

1 33. The method of Claim 31 wherein the enoyl reductase has the amino acid  
2 sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:2  
3 comprising a conservative amino acid substitution, SEQ ID NO:4, SEQ ID NO:4  
4 comprising a conservative amino acid substitution, SEQ ID NO:6, SEQ ID NO:6  
5 comprising a conservative amino acid substitution, SEQ ID NO:10, SEQ ID NO:10  
6 comprising a conservative amino acid substitution, SEQ ID NO:12, SEQ ID NO:12  
7 comprising a conservative amino acid substitution, SEQ ID NO:14, SEQ ID NO:14  
8 comprising a conservative amino acid substitution, SEQ ID NO:16, SEQ ID NO:16  
9 comprising a conservative amino acid substitution, SEQ ID NO:18, SEQ ID NO:18  
10 comprising a conservative amino acid substitution, SEQ ID NO:20, SEQ ID NO:20  
11 comprising a conservative amino acid substitution, SEQ ID NO:52, SEQ ID NO:52  
12 comprising a conservative amino acid substitution, SEQ ID NO:54, SEQ ID NO:54  
13 comprising a conservative amino acid substitution, SEQ ID NO:56, SEQ ID NO:56  
14 comprising a conservative amino acid substitution, SEQ ID NO:50, and SEQ ID  
15 NO:50 comprising a conservative amino acid substitution.

1 34. A method for identifying an agent that can bind to an enoyl reductase  
2 comprising:  
3 (a) contacting an enoyl reductase or active fragment thereof with a  
4 compound; wherein said enoyl reductase comprises the amino acid sequence of SEQ  
5 ID NO:45 and a flavin prosthetic group or the amino acid sequence of SEQ ID NO:57;

6 and

7 (b) determining if the compound binds to enoyl reductase; wherein a  
8 compound is identified as an agent that binds the enoyl reductase when the compound  
9 binds to the enoyl reductase.

1 35. The method of Claim 34 wherein the enoyl reductase has the amino acid  
2 sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:2  
3 comprising a conservative amino acid substitution, SEQ ID NO:4, SEQ ID NO:4  
4 comprising a conservative amino acid substitution, SEQ ID NO:6, SEQ ID NO:6  
5 comprising a conservative amino acid substitution, SEQ ID NO:10, SEQ ID NO:10  
6 comprising a conservative amino acid substitution, SEQ ID NO:12, SEQ ID NO:12  
7 comprising a conservative amino acid substitution, SEQ ID NO:14, SEQ ID NO:14  
8 comprising a conservative amino acid substitution, SEQ ID NO:16, SEQ ID NO:16  
9 comprising a conservative amino acid substitution, SEQ ID NO:18, SEQ ID NO:18  
10 comprising a conservative amino acid substitution, SEQ ID NO:20, SEQ ID NO:20  
11 comprising a conservative amino acid substitution, SEQ ID NO:52, SEQ ID NO:52  
12 comprising a conservative amino acid substitution, SEQ ID NO:54, SEQ ID NO:54  
13 comprising a conservative amino acid substitution, SEQ ID NO:56, SEQ ID NO:56  
14 comprising a conservative amino acid substitution, SEQ ID NO:50, and SEQ ID  
15 NO:50 comprising a conservative amino acid substitution.

1 36. A method for identifying a drug that inhibits bacterial growth comprising:  
2 (a) administering the agent of Claim 31 to a bacterial cell;  
3 (b) determining the growth of the cell; wherein an agent that inhibits the  
4 growth of the cell relative to the growth in the absence of the agent is identified as a  
5 drug that inhibits bacterial growth.

1 37. A pharmaceutical composition comprising the drug of Claim 36 and a  
2 pharmaceutically acceptable carrier.

1 38. An isolated nucleic acid encoding a polypeptide comprising the amino acid  
2 sequence of SEQ ID NO:57, wherein said polypeptide acts enzymatically as an enoyl

3 reductase.

1 39. The isolated nucleic acid of Claim 38 wherein the polypeptide has an amino  
2 acid sequence selected from the group consisting of SEQ ID NO:52 and SEQ ID  
3 NO:52 comprising a conservative amino acid substitution.

1 40. An isolated polypeptide comprising the amino acid sequence of SEQ ID  
2 NO:57, wherein said polypeptide acts enzymatically as an enoyl reductase.

1 41. The polypeptide of Claim 40 comprising an amino acid sequence selected  
2 from the group consisting of SEQ ID NO:52 and SEQ ID NO:52 comprising a  
3 conservative amino acid substitution.

1 42. A fusion protein comprising the polypeptide of Claim 40.

1 43. An antigenic fragment of the polypeptide of Claim 41.